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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,026	09/02/2003	Takashi Yoshimura	Q77250	1554

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EXAMINER	
LIN, SUN J	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/652,026	Applicant(s) YOSHIMURA ET AL.	
	Examiner Sun J Lin	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,8 and 12* is/are allowed.

6)☒ Claim(s) *1-3,5-7 and 9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/31/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 10/652,026 filed on 09/02/2003. Claims 1 – 12 remain pending in the application.

Specification Objections

2 The specification is objected to because of following informalities:

Page 4, line 16, change "thee" to **—there—**.
Page 4, line 22, delete **—therefore,—**.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 – 3 and 5 – 7 are rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 5,481,624 to *Kamom*.

5. As to Claim 1, *Kamom* shows and discloses the following subject matter:

- *Mask* (*reticle*) *inspecting method* ... used for the inspection ... in an *exposure step* of a process of *manufacturing a semiconductor device* – [Field of the Invention; col. 1, line 6 – 9]; *Mask manufacturing* (i.e., *reticle fabrication*) method – [col. 1, line 59]; Notice that, "*mask*" and "*reticle*" are the same things as indicated by the applicants – [specification, page 1, line 12];
- A *circuit pattern* "*designed*" by a circuit designer with *CAD* is stored as *pattern data* – [col. 1, line 48 – 50; Fig. 9]; Notice that the *CAD pattern data* is a *mask (reticle) design data*;
- *CAD pattern data* is *converted* into *electron beam data (pattern)* (*"EB" data pattern*) by an *EB data generating part 9* – [Fig. 9; col. 1, line 51 – 54]; Notice

that the ***EB data pattern*** **is an** ***exact duplicate*** **of the** ***CAD pattern data***; therefore, it is an ***inspection data*** for use in *mask defect inspection*, and the *EB data generating part 82* is a ***second data conversion device***;

- The *electron beam data (pattern)* is converted/written into *mask image data* (i.e., *electron beam write data*) on a *mask (reticle)* through *mask manufacture part 84* – [Fig. 9]; Notice that the *CAD pattern data* is converted into the *mask image data* (*electron beam write data*) on a *mask* through *Step 82 – Step 84*; therefore, a conversion device including units performing *Step 82 – Step 84* is called a ***first data conversion device***;
- The *inspection data* (*electron beam data pattern*) stored in the *EB data storage 83* are compared with the *image data* (*electron beam write data*) stored in the *image data storage 86* in a *data checking part 87* (i.e., *data verification device*) to verify whether of not there is a *data defect* (i.e., *data conversion error*) – [Fig. 1];
- Passing inspection, the *(photo)mask* (*reticle*) (can be fabricated) and applied in the exposure step of the process of manufacturing a semiconductor device – [col. 2, line 46 – 48]; It means that a mask (reticle) is fabricated using the *image data* (*electron beam write data*) after verifying that the *image data* (*electron beam write data*) is data correctly converted from the *CAD design data*;
- Quality of the mask (reticle) is inspected based on the *inspection data* (*EB data pattern*) due to the fact that the *inspection data* (*EB data pattern*) is an *exact duplicate* of the *CAD pattern data*.

For reference purposes, the explanations given above in response to Claim 1 are called **[Response A]** hereinafter.

6. As to Claim 2, in addition to reasons for subject matter regarding *comparing*, *fabricating* and *inspecting* as explained in **[Response A]** given above, *Kamom* shows and teaches the following subject matter regarding "converting":

- *Circuit (design) pattern* designed by a circuit designer with *CAD (computer aided design) tool* – [col. 1, line 48 – 49]; Notice that the *circuit (design) pattern* is a *figure pattern* of a circuit to be written on a *mask* (*reticle*); the *original circuit (design) pattern* is a (*preliminary*) *first electron beam write data*, which is

converted to a preliminary *image data* (i.e., *CAD pattern data*) using the *CAD tool*;

- The *CAD pattern data* (i.e., *first electronic beam write data*) is converted to an *image data* (***second electron beam write data***). Notice that the *CAD pattern data* is converted into the *mask image data* (*electron beam write data*) on a *mask* through *Step 82 – Step 84*; therefore, a conversion unit included units performing *Step 82 – Step 84* is called a ***first data conversion device*** as explained in **[Response A]**.
- *CAD pattern data* (*first electronic beam write data*) is *converted* into *electron beam data (pattern)* (*"EB" data pattern*) by an *EB data generating part 9* – [Fig. 9; col. 1, line 51 – 54]; Notice that the ***EB data pattern*** **is an** ***exact duplicate*** **of the** ***CAD pattern data***; therefore, it is an ***inspection data*** for use in *mask defect inspection*, and the *EB data generating part 82* is a ***second data conversion device***;

For reference purposes, the explanations given above in response to Claim 2 are called **[Response B]** hereinafter.

7. As to Claim 3, reasons are included in **[Response A]** and **[Response B]** given above. Notice that the *first conversion device* is a conversion device including units performing *Step 82 – Step 84* as explained in [Response A]. The *second conversion device* is the EB data generating part 82 as explained in [Response B].

8. As to Claims 5 – 7, *Kamom* teaches the subject matter regarding *data checking part 87* (*data verification device*) – [col. 2, line 26 – 45]. Notice that the *EB data* (*inspection data*) and *image data* (*electron beam write data*) are compared through *(raster) scanning*.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was

made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

(1). Determining the scope and contents of the prior art.
(2). Ascertaining the differences between the prior art and the claims at issue.
(3). Resolving the level of ordinary skill in the pertinent art.
(4). Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 9 – 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,481,624 to *Kamom* in view of U.S. Patent No. 6,723,973 B2 to *Saito*.

11. As to Claims 9, *Kamom* teaches applying *(raster) scanning method* in the *data checking unit* (*data verification device*) in verifying the *data conversion error*, *Kamom* does not teach using a method of converting the *image data* (*electron beam write data*) and the *EB data* (*inspection data*) to respective two-dimensional coordinate data and comparing them together. But *Saito* teaches a method of *image matching* in comparing *target image* (i.e., *design pattern*) and *image under inspection* – [col. 10, line 58 – col. 11, line 39; col. 12, line 46 – 54].

Saito also shows and teaches the following subject matter:

- An *electron beam lithography system* for use in fabrication of a *mask* (*reticle*) – [col. 1, line 9 – 15];
- Electron beam, inspection system – [Fig. 4];
- CAD data, design data – [col. 3, line 54];
- Two-dimensional patterns of *reference image* (*CAD design data*, *inspection data*) and inspected image (e.g., using two-dimensional coordinate data). Deviation of pattern elements, misaligned in the Y-direction ... misaligned in the X-direction – [Fig. 13(a); Fig. 13(B); col. 3, line 9 – 14];
- Difference between *image data* (i.e., *electron beam write data*) and *reference data* (*inspection data*) – [col. 3, line 55 – 56];

- Each *inspected image* is compared with the *reference image* (*design data*) corresponding to the *inspected region* by image processing unit. *Deviation* at field boundaries or shot boundaries are detected – [col. 6, line 36 – 40].

Notice that the *image matching* method converting the *reference data* (*design data*) and *image data under inspection* to two-dimensional images having two-dimensional coordinate data in order to precisely detect the *physical deviation* between these to pattern data thereby accurately verifying a data conversion error visually.

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have applied the teachings of *Saito* in converting the *electron beam write data* and the *inspection data* to two-dimensional coordinate data and applying *image matching* method to precisely detect the *physical deviation* between these two data thereby accurately verifying a *data conversion error* visually.

For reference purposes, the explanations given above in response to Claim 9 are called **[Response C]** hereinafter.

12. As to Claims 10 and 11, reasons are included in **[Response C]** given above.

Allowable Subject Matter

13. Claims 4, 8 and 12 are allowed. Those claims are allowed is because that the prior art does not teach or fairly suggest the following subject matter:

- A reticle fabrication method comprises a step of *converting CAD (Computer Aided Design) which is reticle design data to first electron beam write data and second electron beam write data by means of a first data conversion device and to first inspection data and second inspection data by means of a second data conversion device*, comparing the *first electron beam write data* with the *first inspection data* in a *first data verification device*, comparing the *second electron beam write data* with the *second inspection data* in a *second data verification device* in combination with other limitations as recited in independent Claim 4.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sun J. Lin whose telephone number is (571) 272-1899. The examiner can normally be reached on Monday-Friday (9:00AM-6:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Sun James Lin
Art Unit 2825
September 30, 2004